Surgical Techniques

Transapical Aortic Cannulation for Acute Aortic Dissection

to Prevent Malperfusion and Cerebral Complications

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We describe a technique for transapical cannulation in cases of acute aortic dissection. This method entails aortic cannulation via the apex of the left ventricle and the aortic valve. When this technique is used, retrograde perfusion prevents such fatal complications as malperfusion or cerebral embolism that can occur with femoral cannulation. Having found no disadvantage in this method, we recommend transapical cannulation as the best cannulation technique for acute aortic dissection. ***(Tex Heart Inst J 2001;28:42-3)***

In cases of acute aortic dissection, most cardiac surgeons choose the femoral artery for aortic cannulation. Frequently, however, patients who are elderly have severe atheromatous changes in the thoracic aorta. Although the femoral artery seems to be intact, its use for aortic return carries a high risk of cerebral embolism because of the atheromatous changes in the thoracic aorta. Alternatively, surgeons may use the axillary artery in the presence of peripheral artery disease or femoral artery dissection, but the use of the axillary artery for cannulation can be troublesome because of the vessel's small diameter.

Thus, either of the above approaches may be inadvisable. In such situations, we recommend aortic cannulation via the apex of the left ventricle and the aortic valve.

Surgical Technique

First, bicaval cannulation is performed for venous drainage. Then a 1-cm incision is made in the apex of the left ventricle, and a 24-F cannula (Kurary® thinwall catheter; Kurary Co.; Osaka, Japan) is passed through the apex and across the aortic valve to lie in the proximal ascending aorta (Fig. 1). The tip of the cannula is situated in the sinus of Valsalva to avoid entering the false lumen. Transesophageal echocardiography is used to ensure accurate positioning, thus avoiding manipulation of the ascending aorta to check the position of the cannula tip. A left ventricular vent is created through the right superior pulmonary vein.

Then cardiopulmonary bypass is established. In all cases of aortic dissection, we use deep hypothermic circulatory arrest with retrograde cerebral perfusion as an adjunctive measure for cerebral protection. After circulatory arrest is achieved, the apical cannula is removed, the incision in the left ventricular apex is closed with a few 5-0 polypropylene interrupted sutures, and distal anastomosis is performed. In most cases, we choose hemiarch repair for the anastomosis. Cardiopulmonary bypass is then reestablished through an 8-mm-diameter branch graft, which is attached to the tube graft for aortic return. Proximal anastomosis is performed during rewarming.

Discussion

Most cardiac surgeons prefer the femoral artery as the arterial cannulation site for acute aortic dissection. However, retrograde perfusion via the femoral artery is not always appropriate; sometimes this results in malperfusion of the aorta. It may also lead to cerebral embolism, because retrograde blood flow through the femoral artery can dislodge débris in patients who have severe atheromatous changes in

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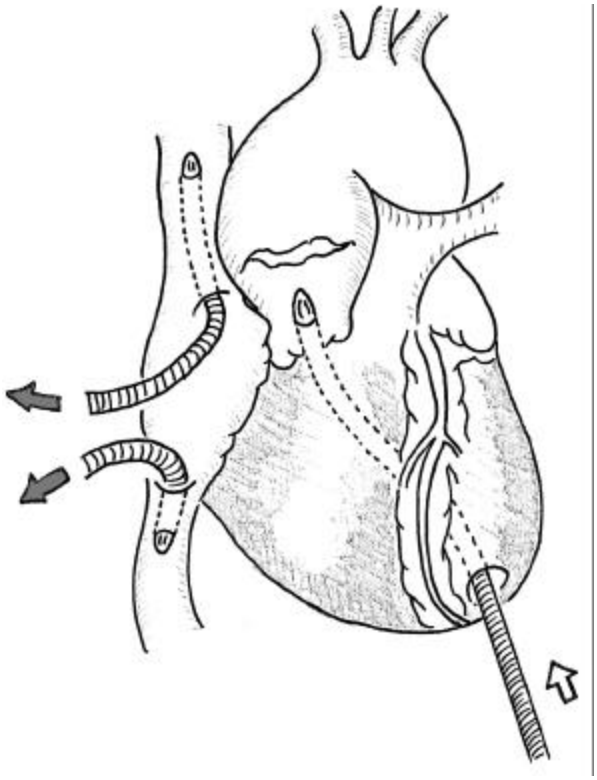

Fig. 1 *A 24-F cannula is passed from the apex of the left ventricle across the aortic valve to lie in the proximal ascending aorta.*

the thoracic aorta. Transapical cannulation can prevent the complications that sometimes occur as a result of retrograde perfusion.

Retrograde passage of a cannula across the aortic valve was originally described by Zwart and associates[1] as part of a left ventricular support system. Although this technique seemed to be very simple and safe, its use was limited to certain patients, such as those with a severely calcified ascending aorta.[2] In cases of acute aortic dissection, however, transapical cannulation is much safer and simpler than femoral cannulation.[3] The cannula can be inserted without difficulty. Moreover, the use of transesophageal echocardiography enables the tip of the cannula to be positioned without risk of entering the false lumen. There is no evidence of aortic regurgitation on transesophageal echocardiography, even after the cannula is inserted into the ascending aorta through the aortic valve. This technique is not practical for use in patients with severe aortic stenosis, in whom the cannula might completely occlude the aortic orifice.

We have applied this method in 12 patients, with no incidence of malperfusion during surgery or of cerebral complication after surgery. Thus far, no disadvantage of this method has been found; therefore, we recommend this technique and suggest that the indications for its use may be extended considerably.

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